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TITLE: SYSTEM AND METHOD FOR CONVERTING A FLOATING DRILLING RIG TO A BOTTOM SUPPORTED DRILLING RIG

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SYSTEM AND METHOD FOR CONVERTING A FLOATING DRILLING RIG TO A BOTTOM SUPPORTED DRILLING RIG

Field of the Invention

The invention relates to mobile offshore drilling rigs, and more particularly to a method for converting a floating drilling rig to a bottom supported drilling rig for use in shallow water applications.

Background

Mobile offshore drilling units move from one drill site on the water to another and may be referred to as MODUs. There are two basic types of MODUs used to drill most offshore wells: (1) bottom supported units including submersibles and jack-ups; and (2) floating units including lake barge rigs, drill ships, and semi-submersibles. Conventional types of MODUs are discussed in detail in U.S. Patent 6,048135 and in "A Primer of Offshore Operations, Second Ed. By Ron Baker, Petroleum Extension Service, Division of Continuing Education , The University of Texas at Austin, 1985.

Submersible MODUs include swamp barges (sometimes referred to as inland barges) which are used in calm, shallow water environments (generally 4 meters or less of water). A swamp barge comprises a barge hull with drilling rig components mounted thereon. A swamp barge rig is moved from location to location in a floating mode. When the rig reaches a prospective drilling location, a portion of the barge hull is flooded and the barge partially submerges and rests on the bottom of the water body or swamp. FIG. 1 illustrates a typical prior art bottom supported submersible barge rig or swamp barge 110. In FIG. 1, a conventional swamp barge 110 is illustrated in the drilling mode. In the drilling mode the bottom of a barge hull 114 rests on the bottom of the swamp or water body 116. The lower portion of the barge hull 114 is submerged below the water line 112; however, the upper portion is above the water line 112.

Jack-up MODUs include a barge hull on which the rig floats when it is being towed from one location to another. The barge hull of a jack-up is

commonly referred to in the industry as the platform. Most jack-up rigs have three or four legs which pass through the platform and are connected to a jacking system. When a jack-up is positioned at the prospective well site, the legs are jacked down in contact with the bottom of the water body. When the legs contact the bottom, the platform is jacked up above the wave line. Jack-ups are used in water depths up to about 150 meters. Referring to FIG. 2, therein is illustrated a typical prior art bottom supported jack-up rig 120 in a drilling mode. The legs 124 rest on the bottom 126. The barge hull (platform) 128 is raised above the water level 122.

Lake barge rigs, drill ships, and semi-submersibles are floating units typically used in water depths greater than where a swamp barge or jack-up is applicable or where bottom conditions precludes use of a swamp barge or jack-up. Drill ships are self-propelled and, therefore, incorporate transportation advantages over other MODU rig types which are typically towed from one location to another. Drill ships are best suited for drilling in deep, open waters far removed from shore. A drill ship has a drilling rig mounted in the middle and includes an opening, referred to in the industry as a moon pool, through which drilling operations are conducted. Drill ships are less desirable than semi-submersibles for use in rough water. Semi-submersibles include a lower barge hull which floats below the surface of the sea and is, therefore, not subject to surface wave action. Large stability columns mounted on the lower barge hull support the upper hull, which includes a main deck and machinery deck above the surface of the water. FIG. 3 illustrates a typical floating semi-submersible rig 130 in the drilling mode. The lower hull 134 is floating below the surface of the water 132. Large stability columns 136 support the upper hull 138 maintaining the machinery deck above the surface of the water 132.

Lake barge rigs include a barge on which the drilling rig is mounted. However, unlike a swamp barge, the barge element of a lake barge is not configured to be submerged. A lake barge rig is transported by towing in a floating mode but also drills in a floating mode. Lake barge rigs are especially applicable to calm moderate depth water environments, and are not suitable for transport or drilling in open water. One calm moderate depth deep water

environment is Lake Maracaibo in Venezuela. The water is calm but too deep for a swamp barge to rest on bottom. The bottom of the lake is covered in pipelines; therefore, it is not desirable to use a jack-up for fear of piercing one of the pipelines with a leg of the jack-up. Therefore, a floating lake barge is desirable. FIG. 4 illustrates a typical floating lake barge rig 140, also referred to as a floating drilling rig, in the drilling mode floating on the surface of the water 142.

The selection of the appropriate MODU for a job is generally based on the location of the well to be drilled, the water depth and the type of wave action. Conventional prior art MODU's designed for floating operations (such as drillships, semi-submersibles, and lake barges) are not suitable for shallow water operations for several reasons. Firstly, floating MODU's generally have too deep of a draft to maneuver in shallow water, and thus are limited in their ability to access well sites. Secondly, in very shallow water it is desirable for stability purposes to ballast down (i.e. sink) the vessel to rest on bottom during operations. Contact between the vessel and the bottom serves as one mechanism to anchor the vessel relative to a new well being drilled or re-entry and re-work of an existing well. The ballast system and hull of floating vessels are not configured to rest on bottom. Thirdly, floating vessels use various anchoring mechanisms, for example cable moorings, that are not well suited for anchoring a vessel in shallow water.

As appreciated by those skilled in the art, each of these MODUs costs many millions of dollars to fabricate. Historically, keeping the supply of each type of rig in balance with the demand at any one time has been difficult. This was made especially difficult because of varying exploration and development drilling trends throughout the world. It may be appreciated that it is not economically attractive to have a MODU costing many millions of dollars sitting idle.

In order to utilize one form of MODU in an environment other than that for which it was designed, U. S. Patent 5,190,140 (the '140 patent, incorporated herein by reference) teaches a method for converting a mat supported jack-up rig to a floating rig. A mat supported jack-up rig is a special type of jack-up rig comprised of a plurality of legs having a supporting mat

attached at one end and having a platform and a jacking system to move the platform up and down. The method comprises: (a) jacking the mat to the platform; (b) permanently joining the top of the mat to the bottom of the platform; and (c) permanently removing the legs. FIG. 5 shows a side view of a representation of a typical mat supported jack-up rig 150 in which the mat is 152 in its normally seafloor position resting on bottom 154 and the platform 158 resides above the water line 156. FIG. 6 hereof shows a side view of the same rig 150 as in FIG. 5 except it has been converted to a floating rig, by jacking the mat 152 to the platform 158, permanently joining the mat 152 to the platform 158, and removing the legs 160. The legs 160, which have no further use, are discarded.

SUMMARY

The present invention is directed to a system and method for converting a floating drilling rig to a bottom supported drilling rig ("converted vessel") and a method of operation of such a converted vessel. The concepts herein, however, are applicable to other types of vessels than drilling vessels.

The method includes securing the floating drilling rig to a support barge to construct a converted bottom supported drilling rig. The support barge is adapted to add the rest-on-bottom functionality to the floating drilling rig. In one exemplary embodiment, the support barge is adapted such that the converted vessel has a shallower draft than the original floating drilling rig. The support barge can have a larger footprint than a footprint of the floating drilling rig. Additional equipment can be installed on the support barge. If the original floating drilling rig is classified for service in a defined body of water, one can seek classification of the converted vessel for service outside the defined body of water. In the method, a plurality of ballast tanks in at least the support barge are filled with water to cause the converted vessel to sink to rest on bottom. Drilling operations can then be performed from the drilling vessel while the converted vessel is resting on bottom.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will be better understood with reference to the following description, claims, and drawings where:

FIG. 1 is a typical prior art bottom supported submersible barge rig ("swamp barge") in drilling mode;

FIG. 2 is a typical prior art bottom supported jack-up rig in drilling mode;

FIG. 3 is a typical prior art floating semi-submersible rig in drilling mode;

FIG. 4 is a typical prior art floating lake barge type drilling rig in drilling mode;

FIG. 5 is a typical prior art mat supported jack-up rig before conversion to floating drilling rig;

FIG. 6 is the mat supported jack-up rig of FIG. 5 after conversion to a floating drilling rig; and

FIGS. 7A and 7B are side views of a drilling rig, originally designed and constructed to conduct drilling operations while floating, modified for conducting drilling operations while sitting on the bottom of a shallow body of water ("converted vessel"). FIG. 7A depicts the converted vessel in floating mode and FIG. 7B depicts the converted vessel sitting on bottom.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS OF THE INVENTION

Referring again briefly to FIG. 4, the lake barge type drilling rig or floating drilling rig 140 has a barge portion 144 with a deck 146 and a substantially planar bottom 148 spaced from the deck 146. A drilling rig package 162, including for example, a derrick package 164 and rotary table 166, is supported by the deck 146 together with various other equipment utilized in drilling operations. The equipment for drilling operations can include equipment for drilling a well, completing the well, and working over the well, as well as other types of equipment. The rotary table 166 is substantially centered about a central axis "A" that substantially coincides with a central

longitudinal axis of the derrick package 164. The derrick package 164 is often positioned above a keyway or slot in the barge 144, though, many times is alternatively cantilevered out over the barge's bow as shown in FIG. 4. Cabins 168 are provided about the deck 146 for crew quarters, operations shacks, and to house various equipment. As will be discussed in more detail below, the lake barge type drilling vessel 140 includes an internal ballast system having multiple chambers that can be controllably filled with water or emptied to compensate for distribution of loads on the barge portion 144.

Because the lake barge type drilling rig 140 is intended for use in the calm, moderate water depth of an enclosed body of water, the barge portion 144 is designed with these characteristics in mind. For example, the lake barge type drilling rig 140 may have a relatively deep draft that would prevent it from entering a shallow water drilling environment such as a river delta or swamp, because the draft may be deeper than the water depth. If the draft is sufficient to enter the shallow water drilling environment, the barge portion 144 may not be deep enough to keep the deck 146 above the water line 142 if the barge were submerged to rest on bottom 170.

Furthermore, the internal ballast system of a typical lake barge type drilling rig 140 is configured primarily to compensate for load distribution on the vessel. As such, it may not be capable of controlled ballasting of the floating drilling rig 140 to rest on bottom 168. Even if the internal ballast system of the drilling rig 140 is capable of ballasting the drilling rig 140 to rest on bottom 168, it is unlikely to be able to also account for tidal variations of the surface water level. Such tidal variations can cause the floating drilling rig 140 to float and move off bottom when the tide is high, or to exert a larger portion of the vessel's 140 weight on bottom than intended and overload the bearing capacity of the bottom 170 when the tide is low.

Additionally because a lake barge type drilling rig 140 is designed for calm waters, such a vessel may not be strong or large enough to handle the winds and large, long wavelength waves encountered in open waters, for example the ocean. As such, the rig 140 may be classified by the relevant governmental regulating body, for example the American Bureau of Shipping (ABS), for restricted service to a particular body of water. For example, a lake

barge type drilling rig 140 may be classified for restricted service in Lake Maracaibo, Venezuela. If the restricted service floating drilling rig 140 is needed to be transported across open waters, it must be transported on another vessel, such as a transport ship.

It is important to note here that although the invention is described with reference to a lake barge type drilling rig, it is within the scope of the invention to apply the concepts described herein to other types of vessels and drilling vessels. One should also note that the design of the lake barge type drilling rig to which this invention applies, can vary from vessel to vessel. For example, some lake barge type drilling rigs to which this invention is applicable, may be classified for open water. Also, some may have a deep enough hull section to rest on bottom and maintain the deck above waterline while still being otherwise unsuitable for operations in a shallow water environment.

Referring to FIGS. 7A and 7B, the present invention involves converting a floating drilling rig configured for use in a particular application for use in a different application. In the present exemplary embodiment, the lake barge type drilling rig 140, originally designed for conducting drilling operations while floating, is converted to a bottom supported drilling vessel for conducting drilling operations in a shallow water environment while resting on bottom 170 by securing the lake barge type drilling rig 140 atop a support barge component 180. The support barge component 180 is configured to add the functionality of a bottom supported drilling vessel to the combination of the floating drilling rig 140 and the support barge component 180. The support barge component 180 and floating drilling rig 140 thereafter become a fully operational single "converted vessel" 200 that operates as a unit both during transporting the vessel 200 to the well site and during drilling operations.

The support barge component 180 has a substantially planar support deck 182 spaced from a substantially planar bottom 184. The support barge component 180 is constructed to support the weight of the floating drilling rig 140 on the support deck 182 both when the vessel 200 is afloat (FIG. 7A) and when the substantially planar bottom 184 of the support barge component

180 is resting on bottom 170 (FIG. 7B). In an exemplary embodiment, the floating drilling rig 140 is attached to the support barge component 180 by stitching fillet welds between the perimeter edge of the floating drilling rig 140 and the support barge component 180. Localized areas where fillet welds are not suitable, are addressed using additional material and welding techniques as needed. Alternately, the floating drilling rig 140 can be affixed to the support barge component 180 in other ways, for example, with fasteners, by welding brackets between the vessels, or various other methods.

If the floating drilling rig 140 is not designed and/or classed for open water, but it is desired to transport the converted vessel 200 through open water, the support barge component 180 can be configured to contribute the needed strength and size to the floating drilling rig 140 so that the converted vessel 200 is suitable for open waters and can be classified as such. For example, if a drilling vessel 140 is classified for service in a defined body of water, one can seek reclassification of the floating drilling rig 140 secured to the support barge component 180 as a single converted vessel 200 for transport and/or service outside the defined body of water. Upon classification of the converted vessel 200 for service outside the defined body of water, the converted vessel 200 can be transported and operated outside the defined body of water without the need of a transport ship.

As needed, the support barge component 180 can be sized to reduce the draft of the converted vessel 200 relative to the draft of the floating drilling rig 140 while ensuring that the combined depth of the barge portion 148 and support barge component 180 is deep enough to retain the planar deck 146 of the floating drilling rig 140 above the water level 142 when the converted vessel 200 rests on bottom 170. For example, a typical shallow water environment suitable for using a vessel that rests on bottom may have a water depth of 2 to 4 meters (m). In an exemplary embodiment, the floating drilling rig 140 has a draft of 3.5 m. Thus, at the shallowest points, the floating drilling rig 140 in this example will hit the bottom 170, and at the deepest points, the drilling rig 140 of this example provides very little leeway for underwater obstructions. Such an exemplary floating drilling rig 140, alone, would not be

suitable for transport through the shallow water environment. However, by combining the floating drilling rig 140 with a support barge component 180 sized such that the converted vessel 200 has a draft of 2 m or less, in accordance with the principles discussed herein, the converted vessel 200 can navigate the shallow water environment. Furthermore, the resulting hull depth of the converted vessel 200 is increased over the hull depth of the floating drilling rig 140 by the depth of the support barge component 180. One can preselect the hull depth of the support barge component 180 to ensure that the planar deck 146 is maintained above the water line 142 when the converted vessel 200 is resting on bottom 170.

Referring to FIG. 8, in order for the converted vessel 200 to have a shallower draft than the original drilling rig 140, the converted vessel 200 displaces a volume of water having a weight equal to the weight of the converted vessel 200. A shallower depth (shorter height dimension of the water displaced) can be achieved by configuring the support barge component 180 with a footprint that is larger than the footprint of the drilling rig 140.

As shown in FIG. 8, the difference in footprint can be substantially consolidated to the front and rear of the drilling vessel 140 to minimize the width of the converted vessel 200. Depending on how far behind the original floating drilling rig 140 the support barge component 180 extends, it may be desirable that the support barge component 180 be provided with a slot or keyway 172 through which the drilling operations can be performed. Also by consolidating the difference in footprint towards the front and/or rear of the floating drilling rig 140, the length of the converted vessel 200 can be longer than the length of the drilling vessel 140. Such longer length can make the converted vessel 200 more stable and better suited than the original drilling rig 140 to handle the large waves encountered during transport in open water.

Although the support barge component 180 is depicted in FIG. 8 as having a greater width than the floating drilling rig 140 component, the support barge component 180 could be provided with a substantially equal or a smaller width than the drilling vessel 140 component. Likewise, it is also within the scope of the invention to consolidate the difference in footprint

substantially to the sides of the floating drilling rig 140 component or to substantially evenly distribute the difference in footprint about the floating drilling rig 140 component.

The converted vessel 200 can be configured to minimize the amount of ballast water needed for trimming by providing a center of gravity that is near to the center of buoyancy of the vessel 200. The support barge component 180 can be configured such that when combined with the drilling rig 140, the center of gravity of the converted vessel 200 is near it's center of buoyancy. Further, this may entail compensating for or counteracting an eccentric center of gravity of the drilling rig 140.

Referring again to FIG. 7A, if the footprint of the support barge component 180 is larger than the footprint of the original floating drilling rig 140 component, the unobstructed space on the support deck 182 of the support barge component 180 can be used for positioning additional equipment or cabins 186. Also, the larger footprint of the support barge component 180 provides additional surface area for bearing on the bottom 170 of the shallow water environment when the converted vessel 200 is ballasted to rest on bottom. This increased bearing area is highly desirable in shallow water environments where such a marsh or river delta where the bottom may have a reduced bearing capacity.

Referring to FIG. 9, the support barge component 180 may have a substantially self contained ballast system 300 that can be operated apart from the ballast system of the original floating drilling rig 140 component. The support barge ballast system 300 is configured to enable the converted vessel 200 to be ballasted down to rest on bottom 170 and to enable trimming the converted vessel 200 level to allow it to operate and transit in the shallowest water depths possible given its displacement. The ballast system 300 includes multiple ballast tanks 302 constructed within the support barge component 180. The ballast tanks 302 are coupled to a ballast pump system 304 through a series of suction 306 and discharge 308 lines. The ballast pump system 304 is configured to pump water surrounding the converted vessel 200 into the ballast tanks 302 and water in the ballast tanks 302 into the water surrounding the converted vessel 200 to individually control the

amount of water delivered to or drawn from each of the ballast tanks 302. By varying the amount of water in the ballast tanks 302, the weight and weight distribution of the converted vessel 200 can be adjusted to compensate for various loading conditions. Furthermore, the ballast tanks 302 are sized so that they can retain enough water to controllably ballast the converted vessel 200 to rest on bottom. Alternately, the ballast tanks 302 can be sized so the ballast tanks 302, in combination with the ballast system of the drilling rig 140 component, can retain enough water to controllably ballast the converted vessel 200 to rest on bottom. A ballast system of the drilling rig 140 component, substantially resembles the ballast system depicted in FIG. 9.

The ballast system 300 can be configured to compensate for changes in water depth, for example from tides or increased stream flow, that may cause the converted vessel 200 to float off from the bottom when the water level rises, or to overload the soil of the bottom when the water level drops. The compensation is achieved by opening ballast tanks 302 to substantially freely communicate with the water about the converted vessel 200, so that as the water about the converted vessel 200 rises, the water level in the ballast tanks 302 rises thereby counteracting any tendency of the converted vessel 200 to float. As the water about the converted vessel 200 subsides, the water in the ballast tanks 302 drains out thereby reducing the weight of the converted vessel 200, so that it does not overload the soil of the bottom. Ballast tanks 302 about the perimeter of the support barge component 180 are provided with one or more equalizing valves 310. The equalizing valves 310 allow water to flow in and out of the ballast tanks 302. If more than one equalizing valve 310 is provided, the equalizing valves 310 can be positioned at different heights, for example, a high valve and a low valve. The high equalizing valve 310 can allow flow of water in and out of the ballast tanks 302, as well as, operate as a vent to the ballast tank 302 while water flows in and out of the low valve 310. The equalizing valves 310 need not be provided in all of the ballast tanks 302. If equalizing valves 310 are omitted from the front most ballast tanks 302 and rear most ballast tanks 302, or maintained in a closed position in these tanks 302, the front and rear ballast tanks 302 can be used to control the front to rear and port to starboard trim of the converted

vessel 200. In one exemplary embodiment, the floating drilling rig 140 component may be modified to include equalizing valves 310 and operate in a similar manner to the ballast system of the support barge component 180.

Referring now to FIG. 10, the support barge component 180 may include a suction breaker system 400 to break the suction formed between the support barge component 180 and the bottom 170 as the support barge component 180 is lifted off bottom by evacuating the ballast tanks 302. The suction breaker system 400 includes a plurality of outlets 402 distributed about the planar bottom 184 of the support barge 140 that are in fluid communication with a suction breaker pump system 404. The suction breaker pump system 404 is operable to pump water, sourced either from the ballast tanks 302 or the water about the converted vessel 200, out the outlets 402. The flow out of outlets 402 breaks suction with the bottom 170 and frees the vessel 200 to float up to the surface.

The support barge component 180 can have a substantially self contained electrical system that is operable apart from the electrical system of the floating drilling rig 140. Alternately, the support barge component 180 can have an electrical system that receives electrical power from and is controlled by the electrical system of the floating drilling vessel 140.

The support barge component 180 can have a substantially self contained machinery cooling water system and fire fighting water system that is operable apart from the machinery cooling water system and fire fighting water system of the floating drilling rig 140. The support barge component 180 can be configured to provide machinery cooling water and fire fighting water to the floating drilling rig 140 and enable the support barge component 180 machinery cooling water system and fire water system to be controlled from the floating drilling rig 140.

Referring again to FIGS. 7A and 7B the converted vessel 200 may be equipped with vertically movable posts 188, or spud piles, that are operable to stab into the water bottom 170 to anchor the converted vessel 200 laterally as it is being ballasted down and while the vessel 200 is resting on bottom. The spud piles 188 can be attached to the original drilling vessel 140 component and/or the support barge component 180. In an exemplary embodiment,

there are four spud piles 188 (FIG. 8); however, it is within the scope of the invention to include fewer or more spud piles 188 positioned anywhere about the perimeter of vessel 200. Furthermore, in an exemplary embodiment, the spud piles 188 can be raised and lowered using a crane 190 on the converted vessel 200 or by a winch system at each spud pile 188 or on the vessel 200.

In an exemplary embodiment, the original floating drilling rig 140 component and the support barge component 180 are combined by ballasting the support barge component 180 down so that the floating drilling rig 140 can be floated over the top. The support barge component 180 need only be ballasted down such that the substantially planar support deck 182 is below the substantially planar bottom 148 of the drilling rig 140. After positioning the floating drilling rig 140 over the support barge component 180, the support barge component 180 is ballasted to float up into contact with the floating drilling rig 140. By further ballasting the support barge component 180 to lift the drilling rig 140 out of the water, the interface between the support barge component 180 and floating drilling rig 140 is more easily accessible to workers to attach the support barge component 180 and floating drilling rig 140 together and to interconnect the various systems. If the floating drilling rig 140 is combined with the support barge component 180 in shallow water, the support barge component 180 can be ballasted down to rest on the bottom 170 while the floating drilling rig 140 is positioned above. In deeper water, the support barge component 180 can be positioned over a vessel transport ship or barge and ballasted down to rest on the transport deck of the vessel transport ship. By resting on bottom or on the vessel transport ship, the support barge component 180 is frictionally retained in position while the floating drilling vessel 140 is positioned above. U.S. Patents 5,855,455 and 6,340,272, incorporated by reference herein, discuss various known methods of positioning a first floating drilling rig on a supporting member.

As an alternative to combining the floating drilling rig 140 and the support barge component 180 in the water, they can be combined in a dry dock by lifting or rolling the floating drilling rig 140 over the support barge component 180.

Once the floating drilling rig 140 is supported on the support barge component 180, the floating drilling rig 140 can be attached to the support barge component 180, as previously described. If the spud piles 188 are not already provided on the support barge component 180, the spud piles 188 can be attached to the support barge component 180 and/or the drilling rig 140.

In use, the converted vessel 200 is towed to the drill site and positioned proximal to the future well bore or an existing well bore to be worked on. Because the support barge component 180 is configured to provide the converted vessel 200 with a low draft, the drill site can be in relatively shallow water. Once the converted vessel 200 is roughly located about the future well bore or existing well, diagonally opposed spud piles 188 can be lowered and stabbed into the water bottom 170. Thereafter, the converted vessel 200 is more precisely located about the future well bore or existing well by lifting one of the spud piles 188 and pivoting the converted vessel 200 around the other spud pile 188. Once in final position, the remaining spud piles 188 are lowered and stabbed into bottom 170. With the spud piles 188 stabbed into the bottom 170, the converted vessel 200 is controllably ballasted down to rest on the bottom 170. The spud piles 188 laterally retain and guide the converted vessel 200 as it sinks to rest on bottom 170. Thereafter, with the converted vessel 200 resting on bottom 170, the ballast system can be opened to communicate with the surrounding water by opening equalizing valves 310. With the equalizing valves 310 open, the water level in the ballast tanks 302 rises and falls with the water level outside the converted vessel 200 maintaining the loading of the bottom 170 by the converted vessel 200 and thus the soil pressure. Because the loading of the bottom 170 is maintained by the water level in the ballast tanks 302 varying with the water outside the ballast tanks 302, the ballast system need not be manually adjusted as the water level fluctuates. Further, the front to rear and port to starboard trim of the converted vessel 200 can be controlled by controlling the water level in the front and rear ballast tanks 302.

If desired, prior to opening the equalizing valves 310, the bottom 170 can be preloaded to prove the soil foundation capability for supporting any

future loadings that may occur while the converted vessel 200 is performing drilling operations. The bottom 170 can be preloaded by selectively filling as many of the ballast tanks 302 in the support barge 180 and the ballast tanks of the drilling vessel 140 as is necessary to apply the desired preload. The preload may be a function of the weight of the converted vessel 200, the loads expected to be encountered during drilling, and any environmentally induced loads, for example, from the water current or wind, the loads as adjusted for by a safety factor. After it has been determined that the soil can support the desired load, the equalizing valves 310 can be opened, thus reducing the load, and the converted vessel 200 left to rest on bottom as described above.

With the converted vessel 200 laterally secured by spud piles 188 and resting on bottom 170, drilling operations, can be performed from the drilling vessel 140. As used herein "drilling operations" includes any operation to be performed on a wellbore including, but not limited to, drilling a new well, completion of an existing or newly drilled well or working on an existing well. When the drilling operations are complete, the suction breaker pump system 404 is operated to flow water out of outlets 402 to break suction between the converted vessel 200 and the bottom 170, the converted vessel 200 is ballasted to float, the spud piles 188 pulled up, and the converted vessel 200 can be moved from the well site.

If it is desired to use the floating drilling rig 140 apart from the support barge component 180, the converted vessel 200 can be disassembled into the floating drilling rig 140 and support barge component 180 by cutting the stitch welds and disconnecting any other connectors, ballasting the support barge component 180 so that the floating drilling rig 140 floats above the support barge component 180, and moving the floating rig 140 from atop the support barge component 180 or alternatively removing the support barge component 180 from under the floating drilling rig 140.

Although the invention has been described in detail with reference to certain exemplary embodiments thereof, other embodiments are possible. Therefore, the spirit and scope of the appended claims should not be limited to the description of the exemplary embodiments contained herein.